We claim:

1. A peptide comprising an agonist of a native sequence:

YLSGANLNL (Seq. ID No: 1)
| |
123456789;

wherein the agonist has at least one amino acid substitution at a non-MHC anchor position of SEQ ID NO: 1 and said agonist has enhanced immunogenicity compared to the native sequence.

2. The peptide according to claim 1 wherein the agonist varies in an amino acid substitution at position 6 from Seq. ID No: 1.

3. The peptide according to claim 1 wherein the agonist varies in an amino acid substitution at position 7 from Seq. ID No: 1.

4. The peptide according to claim 1 wherein the agonist varies in an amino acid substitution at position 6 and position 7 from Seq. ID No: 1.

5. The peptide according to claim 1 comprising an amino acid sequence selected from the group consisting of: YLSGADLNL (Seq. ID No: 2), YLSGADINL (Seq. ID No: 3), YLSGANINL (Seq. ID No: 4), YLSGACLNL (Seq. ID No: 5), and combinations thereof.

6. A peptide consisting of the amino acid sequence YLSGADLNL (Seq. ID No: 2), YLSGADINL (Seq. ID No: 3), or YLSGANINL (Seq. ID No: 4), YLSGACLNL (Seq. ID No: 5).

7. A pharmaceutical composition comprising at least one peptide according to any of claims 1 through 6 and a pharmaceutically acceptable carrier.

8. The pharmaceutical composition according to claim 7 further comprising an immunostimulatory molecule.

9. The pharmaceutical composition according to claim 8 wherein the immunostimulatory molecule is selected from the group consisting of IL-2, B7.1, B7.2, ICAM-1,

AMENDED SHEET

LFA-3, CD72, GM-CSF, TNFα, INFγ, IL-12, IL-6 and combinations thereof.

10. The pharmaceutical composition according to claim 7 further comprising an HLA class I molecule or a cell expressing an HLA class I molecule.

11. The pharmaceutical composition according to claim 7 further comprising a chemotherapeutic drug, antibiotic, antiviral drug, antifungal drug, or cyclophosphamide.

12. The pharmaceutical composition according to claim 7 further comprising an adjuvant.

13. The pharmaceutical composition according to claim 12 wherein the adjuvant is selected from the group consisting of alum, incomplete Freund's adjuvant, QS21, and Ribi Detox™.

14. A peptide-immunoglobulin conjugate comprising the peptide according to any of claims 1 through 6 and an immunoglobulin molecule.

15. The pharmaceutical composition according to claim 7 wherein the peptide is incorporated into a liposome.

16. A peptide-carrier molecule conjugate comprising the peptide according to claim 1 conjugated to a carrier molecule.

17. The peptide-carrier molecule conjugate according to claim 16 wherein the carrier molecule is selected from the group consisting of influenza peptide, tetanus toxoid, tetanus toxoid-CD4 epitope, Pseudomonas exotoxin A, poly-L-lysine, a lipid tail and an endoplasmic reticulum signal sequence.

18. A kit comprising the agonist peptide

AMENDED SHEET

according to claim 1 and a vector comprising a nucleic acid sequence encoding CEA.

19. The kit according to claim 18 further comprising an immunostimulatory molecule.

20. An isolated DNA comprising a nucleotide sequence encoding the peptide according to any of claims 1 through 6.

21. An isolated DNA encoding a peptide comprising the amino acid sequence selected from the group consisting of: Seq. ID No: 2, Seq. ID No: 3, Seq. ID No: 4, Seq. ID No: 5, and combinations thereof.

22. An isolated DNA comprising a nucleotide sequence of SEQ. ID No: 7 or 8.

23. A vector comprising the DNA of claims 20, 21 or 22.

24. The vector according to claim 23 wherein the vector is an E. coli plasmid, a Listeria vector, an orthopox virus, avipox virus, capripox virus, suipox virus, vaccinia virus, baculovirus, human adenovirus, SV40 or bovine papilloma virus.

25. The vector according to claims 23 or 24 further comprising a nucleotide sequence encoding at least one HLA class I molecule.

26. A host cell comprising the vector according to claim 23.

27. The host cell according to claim 26 wherein the host cell additionally expresses an HLA class I molecule.

28. The host cell according to claim 26 wherein the host cell is an antigen presenting cell.

29. The host cell according to claim 28 wherein the host cell is a dendritic cell.

AMENDED SHEET

30. A method for treating a host having a tumor expressing CEA or epitope thereof comprising introducing cytotoxic T lymphocytes specific for CEA or epitope thereof to the host and at a periodic interval thereafter introducing to the host at least one agonist peptide according to any of claims 1 through 6.

31. The method according to claim 30 wherein the peptide comprises the amino acid sequence selected from the group consisting of: Seq ID Nos: 2, 3, 4, 5 and combinations thereof.

32. A method of inhibiting a CEA epitope-expressing carcinoma cells in a patient comprising administering to said patient an effective amount of the peptide according to any of claims 1 through 6.

33. The method according to claim 32 further comprising administration of at least one immunostimulatory molecule.

34. The method according to claim 33 wherein the immunostimulatory molecule is selected from the group consisting of IL-2, B7.1, B7.2, ICAM-1, LFA-3, CD72, GM-CSF, TNFα, INFγ, IL-12, IL-6 and combinations thereof.

35. The method according to claim 32 further comprising administration of an adjuvant.

36. The method according to claim 32 wherein the carcinoma cell is gastrointestinal, breast, pancreatic, bladder, ovarian, lung, or prostate carcinoma cells.

37. The method according to claim 32 further comprising the administration of a vector comprising the gene encoding CEA.

38. A method of inhibiting or killing CEA epitope-expressing carcinoma cells comprising:

A) generating CEA epitope or agonist peptide-specific cytotoxic T lymphocytes *in vitro* by stimulation of lymphocytes from a source with an effective amount of an agonist peptide according to any of claims 1 through 6 alone or in combination with an immunostimulatory molecule; and

B) adoptively transferring the CEA epitope or agonist peptide-specific cytotoxic T lymphocytes alone or in combination with the agonist peptide into a mammal in an amount sufficient to inhibit or kill the CEA epitope expressing carcinoma cells.

39. A method of inhibiting or killing CEA epitope-expressing carcinoma cells in a mammal comprising:

A) generating CEA epitope or agonist peptide-specific cytotoxic T lymphocytes *in vivo* by administration of an effective amount of a agonist peptide according to any of claims 1 through 6, an effective amount of a vector comprising a nucleic acid sequence encoding CEA or agonist peptide pulsed antigen presenting cells; and

B) at a periodic interval providing the agonist peptide according to any of claims 1 through 6 alone or in combination with an adjuvant;

wherein the CEA epitope or agonist peptide-specific cytotoxic T lymphocytes so generated inhibit or kill CEA epitope-expressing carcinoma cells.

40. A peptide comprising an antagonist of a

native sequence: YLSGANLNL (Seq. ID No: 1) wherein the antagonist has at least one amino acid substitution at a non-MHC anchor position of SEQ. ID No: 1 and the antagonist inhibits CEA-specific immune responses.

41. A pharmaceutical composition comprising the peptide according to claim 40 and a pharmaceutically acceptable carrier.

42. A method of inhibiting CEA-specific immune responses comprising administration of the peptide according to claim 40 in an amount effective to inhibit the CEA-specific immune responses.

43. The method according to claim 42 wherein cytotoxic T lymphocytes specific for CEA or epitopes thereof are inhibited.

44. A peptide-pulsed cell comprising an antigen presenting cell pulsed with a peptide according to any of claims 1 through 6.

45. The peptide-pulsed cell according to claim 44 wherein the antigen presenting cell is selected from the group consisting of dendritic cell, B lymphocyte, monocyte and macrophage.

add
B'